Space Weather Forecast

Issued on Saturday, 09 December 2023 at 12:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of R1-R2 Radio Blackouts throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate due to a pair of impulsive Moderate-class flares from the largest and most magnetically complex spot group in the southwest of the visible disc. There are currently eight numbered regions on the disc. As mentioned above, the largest and most magnetically complex group is located in the southwest of the disc, with further growth evident and a magnetically complex spot configuration in one of the lead portion spots. The other large bipolar spot group is located in the northeast and has moderate magnetic complexity, with growth and consolidation observed in its main lead spot in recent imagery. Remaining spot groups are smaller and magnetically simpler, and show only small recent changes.

No new Earth-directed Coronal Mass Ejections (CMEs) were evident in available imagery. Some faint and slow ejecta was discernible following the initial Moderate-class flare late in the UTC day of the 8th, which was modelled but does not indicate any significant impacts at Earth.

Solar Wind / Geomagnetic Activity: Solar winds were reflective of a gradual exit from the recent fast solar wind regime. The solar wind speed showed a slow decline through slightly elevated levels in the 24 hours, with the number of particles in the wind near the long-term average. The associated magnetic field showed a roughly level tendency near background, while the north-south component showed only weak variation. The resultant geomagnetic activity was Quiet (Kp 0 to 2) throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a chance of further Moderate-class flares, with potential sources most likely to be sunspot regions on either the southwest or northeast of the Sun. Chances drop slightly on day four (Tuesday 12 December), with the expected departure of several western solar hemisphere regions and a relative lack of oncoming eastern replacements.

Solar Wind / Geomagnetic Activity: There is one marginal CME in the forecast, with a glancing blow from the 07 December northeastern quadrant filament perhaps coinciding with an arriving fast solar wind late on Sunday 10 December. Elevated speeds may be reached, with the combined effect potentially resulting in a peak slight chance of a G1/Minor Geomagnetic Storm interval, perhaps extending into Monday 11 December, and which may be further complimented by any fast wind from yet another minor coronal hole fast wind.

Energetic Particles / Solar Radiation: There is a daily Slight Chance of Solar Radiation Storms, with the active spot group in the southwest by far the most likely source.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	20	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	40
Very Active	R3 to R5 X	No	10	10	10	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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